THE VETERINARY RECORD

A Weekly Journal for the Profession.

Edited by William Hunting, F.R.C.V.S.

No. 717. APRIL 5, 1902. Vol. XIV.

Misinterpretation.

From a leading article in a recent number of *The St. James's Gazette* we take the following paragraph which is not easily equalled for simple ignorance.

"Speaking in the House of Commons on Friday last, Major Evans Gordon asserted that the death-rate of horses in the remount depots in South Africa for the past ten months had averaged about seven thousand per month, as against four thousand per month with the columns. What is the explanation of this state of things? Horses with the columns are liable to the chances of action. If they break down badly they are, no doubt, put out of existence on the spot, and only if there is a reasonable chance of their being again rendered fit for service are they sent back to the depots. Yet the "death rate" among the fresh horses and curable invalids is nearly double that of those which are undergoing hard work and the risks of battle. It is, we fear, only too likely that there is truth in the reports which tell us that the one notion the Army Veterinary Department has of curing a horse is to shoot it, for we do not believe that this vast number of animals die of "enteric where not otherwise stated."

The editorial writer asks "What is the explanation of this state of things?" and, in default of knowledge, suggests that it is due to "the one notion the Army Veterinary Department has of curing a horse by shooting it."

When men write on subjects of which they have no knowledge they ought to refrain from inventing stupid explanations and libelling a whole department of hard-working experts who cannot reply.

If the editor of the "St. James's" had taken the trouble to submit the facts to any large owner of horses he would have been told that the proportion of deaths amongst newly-purchased horses is always higher than amongst the seasoned horses doing hard work. The death-rate of any omnibus or tramway stud would be reduced 50 per cent. if it were not for the fatalities amongst the new purchases during their first three months. The death rate in South Africa is seven new horses to four workers. We are surprised that the proportion is so favourable. When it is known that the greatest losses among horses, as among men, is due to contagious diseases—glanders, influenza, strangles, pneumonia, etc., it will be evident even to an editor of a daily paper that the place where deaths will mostly occur is in the remount depots. One attack gives immunity against a second, and those horses that leave the remount depots in good health and condition suffer afterwards from nothing very fatal save injuries and over work.

Major Evans Gordon who mentioned the facts, so grossly misunderstood by the able editor, knows enough about horses to prevent him falling into such a stupid error as we have indicated.

A mistake or—what?

The British Medical Journal in its issue of March 22nd publishes the following paragraph under the head "Notes in Parliament."

Glanders.—Mr. Hanbury stated at the end of last week, in reply to a request for legislation in view of the prevalence of glanders in and about the metropolitan area that the Departmental Committee of the Board of Agriculture had reported that further investigation of the nature of the disease, even in some of the most elementary facts, was necessary, before their recommendations could be adopted with any certainty of success. Such an inquiry was instituted in January of last year, and a report was expected within the next few weeks.

It will doubtless at first occur to anyone with knowledge that this report is incorrect but, we regret to add, those who have noted the frequency with which Mr. Hanbury has made statements about diseases of animals—statements having no foundation save in his own imagination, will accept the report as true. All Ministers of State must occasionally be evasive, but it is a new departure to make statements positively untrue. There are two assertions in the above paragraph. First—that the Departmental Committee reported that further investigation of the nature of the disease was necessary before their recommendations could be adopted with any certainty of success. We reply that the Committee did nothing of the sort, and that Mr. Hanbury can point to no sentence in the report which affords even an excuse for his statement. The second assertion is—that "such an inquiry was instituted in January of last year." With full knowledge of the facts we reply that the inquiry instituted last January was not carried out "for further investigation of the nature of the disease." Mr. Hanbury ought to know what the work of his department is. If he does not surely there are officials who could inform him. In any case it is inexcusable from his place in Parliament to give answers which are inaccurate and misleading. Only Mr. Dillon could properly characterise such conduct.

Voting for Councilmen.

Members living abroad will be puzzled, as usual, how to use their voting papers. The papers are sent out early enough to be filled up and returned before the election, but they are sent out blank. As no vote can be registered unless a candidate has been nominated, and as no nominations are in existence when the papers are sent out, the whole thing is a farce. It is not easy to supply a remedy. To compel all nominations to be made before March 31st would be unfair to candidates. It seems to us that if candidates would have their nominations made early—say in February—that they would obtain many votes from members living abroad.

CASES AND ARTICLES.

SOUTH AFRICAN (MALARIAL) BILIARY FEVER OF THE HORSE.

By D. Hutcheon, C.V.S., Cape Town.

This is a specific form of fever which affects horses over a large portion of South Africa. In the Cape Colony it is more prevalent in the Cape Peninsula, and along the East Coast extending about one hundred miles inland, than elsewhere, but its area of infection has been extending, and cases are now met with all over the South African Colonies.

It may occur at any season of the year near to the coast, but is is most prevalent during the summer and autumn months. It is just as common amongst stabled horses as amongst those that are rarely within a stable. Exercise, or the want of it appears to have little or no influence on its origin. I have seen it occur in a racehorse immediately after several race meetings in which he took a prominent part, and it is equally severe on idle horses that are rarely out. Imported horses are more subject to it than Colonial bred. Horses which are brought to the coast from the high inland districts—where the disease is rarely met with—are also more susceptible to an attack than those bred on the coast. I know of several farms where almost every strange horse which is brought there during the summer or autumn months contracts the disease. Horses are liable also to a second attack, but such horses in my experience have been removed from the infected centre subsequent to the first attack, and became reinfected on their return. Horses reared continuously on the same farm do not contract the disease a second time, and many horses which are bred and reared on such farms do not become visibly affected with the disease at all.

South African biliary fever—the name which I gave it at first, was for a number of years described as a biliary form of South African horse-sickness, but although a very acute attack of this fever may bear a close resemblance to horse-sickness, it is still manifestly distinct from it in its nature and originating cause.

I had met with individual cases of this disease during the years 1881-'84, and although even at that time I considered it to be distinct from horse-sickness, I made the mistake of including in my descriptions of it cases of acute and chronic disease of the liver of the horse, which are very common in South Africa, and of which I may have something to say later.

It was in 1885 that I first had an opportunity of studying a series of cases of biliary fever which occurred in the neighbourhood of Port Elizabeth, and I had then little difficulty in distinguishing it from horse-sickness. It occurs persistently on many farms where horse-sickness is never met with, and it is just as liable to attack horses which are constantly stabled as those which graze on the veldt.

In writing in May, 1890—*Agricultural Journal*, vol. ii, p. 361—I drew attention to the fact that cases of horse-sickness had not been heard of within the greater portion of the Cape Colony for many years until the autumn of that year, when it occurred with its usual virulence in the districts which it visited, while a year never passed without producing a large number of cases of biliary fever in districts in which it usually appeared.

Again in January, 1895, I wrote: "I am convinced that biliary fever is distinct in its origin from horse-sickness, and amenable to different treatment. Its originating cause is undoubtedly something special and specific, but whether it is atmospheric or telluric I do not know. It is not infectious in the ordinary acceptation of that term, as it rarely goes consecutively through a stable of horses in any of the outbreaks which I have observed, but I have a strong opinion that the infective agent remains about a stable or farm where the disease has once appeared."

Nothing further was done until in the early part of 1900 Veterinary Surgeon William Robertson, of this Department, had his attention directed to this disease, and in his microscopic examinations of the blood obtained from an affected animal he found certain micro-organisms in the red blood corpuscles closely resembling the organisms seen in the blood corpuscles of man when suffering from malarial fever.

Previous to this Dr. Theiler, veterinary surgeon to the late Transvaal Government, sent me a private note in which he intimated that he had seen certain organisms in the blood, but giving no description of them.

The following are Mr. Robertson's notes on the subject:—

While examining blood films from animals suffering from South African biliary fever, I have noticed the presence in every case examined of an intra-corpuscular body, or parasite, in the red blood corpuscles. These parasites vary in shape and appearance, and in the commonest form met with resemble in a marked degree one stage in the life-history of the malarial parasite in man. This form approaches the spherical, stains very faintly in the centre, and deeply at several—as far as I can make out four—points in the margin. Another form is a rosette or fan-pointed star resembling four Indian clubs with their ends approximating, and this I take to be a segmentation form, and is seen in almost every case examined in a late stage of the disease. These rosettes are very sparingly distributed, many covers having to be examined before this body is met with. A third stage, or variety of the parasite, is paddle-shaped, not unlike a thin pyrosoma of red-water. Many of the red corpuscles also contain pigment granules.

The best stains for demonstrating this intra-corpuscular parasite I have found to be carbol fuchsin blue or eosin and methyline blue (Cheuzunski's formula). Care is required in fixing the films of blood. I prefer first exposure to vapour of formalin, followed by immersion in equal parts alcoholic absolute and æther. As the disease, when properly treated, seldom proves fatal, I have not had many opportunities of submitting the internal organs to microscopical examination, but in two cases I found the parasite in

smears from the spleen. The liver is in a condition of cloudy swelling, due perhaps to the rise in temperature."

The few attempts which Mr. Robertson was able to make to communicate the disease to healthy horses by the subcutaneous and intravenous injection of blood drawn from an affected animal proved negative. It is very doubtful, however, whether the horses experimented upon had, or had not, been previously affected with the disease, as they had to be obtained within an area in which the disease is prevalent, and the pressure of other work has prevented us from renewing the experiment.

Judging from the manner in which other diseases of a similar character are communicated it is very probable that the infection is conveyed to healthy horses through the medium of some skin parasite.

Symptoms.—The onset of the disease is sudden, the temperature rising rapidly, I have seen a horse eat his morning feed and be manifestly ill by ten o'clock. The patient looks dull and depressed, hangs his head, breathing and pulse are quickened and his temperature rapidly rises to 103, 104, and 106, and in severe cases even to 107. The respirations may range from 40 to 60 per minute, and the pulsations from 80 to 120. In mild cases the patient may continue to eat a little attractive food such as carrots, lucerne, and such like, but in more severe cases the appetite fails completely, but there is considerable thirst, and a little oatmeal or bran may be taken in the drinking water. Very early in the attack the mucous membrane lining the eyelids presents a deep pinkish yellow colour, and the mucous membrane lining the lips may present the same appearance, but it is not so intense, nor so common. The horse appears uneasy, moving his legs in a restless manner, while his breathing becomes quickened and accompanied by deep sighs as if suffering from a feeling of oppression. In many cases there are indications of abdominal pain and uneasiness, more especially when the bowels are constipated, which they usually are, the fæces being covered with mucus. The urine is generally of an amber colour, but it may become like dark sherry. If the patient is turned out on the veld he generally stands with head depressed in a dejected and listless manner, and if the attack is prolonged there is often a slight œdema under the skin about the head very similar to a slight attack of the Dikkop form of horse-sickness.

Course of the Disease.—Usually the fever lasts from four to seven days, although some cases may last much longer. In the great majority of cases that are properly attended to and recover, the temperature usually begins to fall on the third day, and the animal may be apparently all right by the sixth day. In fatal cases the temperature remains high, the breathing becomes quicker and more distressing, and the general uneasiness greater until the end; death may take place from the fourth to the eighth day. Patients which are most liable to succumb to the disease are aged or overfed horses, in which there is fatty or other degeneration changes in the liver.

Post-mortem appearances.—As already remarked the fatal cases are those that are either neglected, complicated by congestion or chronic disease of the liver, or killed by purgatives. The ordinary cases, even when severe, recover so rapidly and leave so little indication of any important pathological changes that the post-mortem appearances in fatal cases do not fairly represent simple uncomplicated cases of the disease. The bowels are usually slightly distended with gas, and a variable quantity of a brownish yellow serous fluid is often found in the abdominal cavity. The liver is more or less congested, usually swollen, and in some cases it presents a deep yellow orange, while in others it has the appearance of cloudy swelling. The spleen is generally a little enlarged, and its substance slightly darker and softer than normal. The mucous membrane of the small intestines, more especially the upper portion presents a catarrhal condition, and contains a variable quantity of a viscid mucus with a yellow tinge corresponding to the colour of the bile. On opening the thorax a variable quantity of straw coloured serous fluid is often found in it, and also in the pericardium, and there may be a slightly œdematous condition of the borders of the lungs, and a catarrhal condition of the air passages.

Treatment.—This is generally satisfactory if it can be properly carried out, and the animal attended to in good time. Active purgatives must be carefully avoided, more especially aloes, even in small doses. During my early experience I tried a number of remedies, but the treatment which for the last fifteen years has given the most satisfactory results generally is the following:

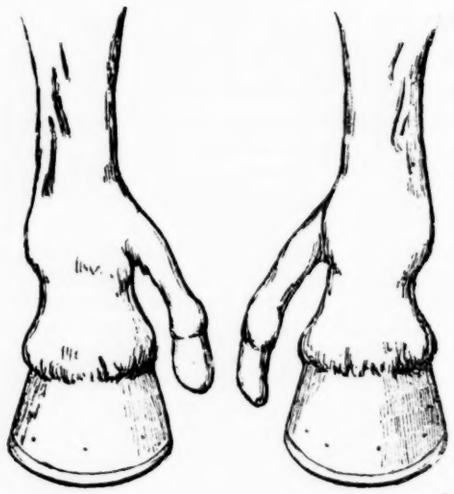
Powdered chloride of ammonia	½ oz.
Extract of belladonna	½ drm.

Common mass sufficient to make a ball.

This is much safer and easier given as a ball, but if there is no one competent to give a ball then the ingredients may be dissolved in a pint of warm water and administered as a draught. This dose should be administered every eight hours and continued until improvement is apparent, usually not more than six doses are required. Quinine in large doses is often added, more especially when the temperature remains high, and Veterinary Surgeon Campbell reported in 1898 that he had obtained excellent results by giving a dose of calomel first, and adding carbolic acid to the chloride of ammonia and belladonna. If the bowels are constipated, give frequent injections of warm water and soap, and a little sulphate of soda may be added to the drinking water, but great care must be exercised to avoid purging, as super-purgation is apt to supervene even with saline laxatives. It is for that reason that I rarely add anything to the original mixture. In cases where there are indications of acute congestion of the liver, I apply hot fomentations to the abdomen continuously. The patient should be immediately placed in a comfortable, clean and well ventilated stable or loose box, and if the weather is cold clothe the body and put bandages on the legs. As the patient is usually thirsty, advantage might be taken of his desire for cold water to add a little bran or oatmeal, or a little saline medicine to it if considered desirable. Under this treatment very few cases will die unless the fever is complicated by chronic disease of the liver.

SUPERNUMERARY DIGITS IN A PONY.

I made this sketch of a pony with two extra digits to-day and think it might be of interest. The digits are situated, as shown, on the insides of the fetlock of the front leg; they seem to be attached to the fetlock by a false joint, or simply skin, but lower down just above the hoof of each there is at least one true joint. They are at least five inches long, two inches of which is hoof, and they reach to within one or two inches of the ground. They strike one another when the pony moves but seem to cause no inconvenience.



They are almost a perfect pastern and foot in miniature. The pony is aged (12), 14 hands, and is drawing bran to the ss. Pinemore, the vessel on which I sail. I am sorry I cannot get a photograph of the feet, also not knowing the language here I could get no history of the animal from the driver.

J. R. R. Hamilton, M.R.C.V.S.
Attached to A.V.D.

Fiume, 10th March, 1902.

SPECIFIC OPHTHALMIA.

A Disorder of the Horse's Eyes in S. Africa.

By H. Karslake Tasker, M.R.C.V.S.

In the first place I wish to apologise for attempting to write on the above subject without being able to refer to the various notes I made when in South Africa upon the numerous cases that came under my treatment whilst serving in the Army Veterinary Department during the last two years. Unfortunately I have mislaid the notes referred to. Nevertheless I venture to hope that the remarks I am about to make will be of some interest to your readers, for, with the exception of South African Horse Sickness I consider this disorder to be one of the most important to study in that country.

Specific Ophthalmia as it appears in horses in South Africa must in a way be looked upon as a serious disorder in so much as it temporarily renders the affected animals unfit for duty. From what I have seen of the disease I am inclined to define it as a severe inflammation of the conjunctiva with or without corneitis in its simplest forms, and as a disorder in which, in its worst forms, certain pathological changes take place in the aqueous humour, probably of an inflammatory nature.

For descriptive purposes I consider it advisable to divide the disorder into five forms, and also because it may present itself in any of the forms I name without any previous symptom. My division, therefore, is as follows:

1. Conjunctival.
2. Conjunctival with corneitis.
3. In which the aqueous humour assumes a white opaque appearance.
4. In which the aqueous humour assumes a yellow opaque appearance.
5. In which the aqueous humour assumes a yellow and red appearance.

From this division it would seem that there are two distinct varieties of specific ophthalmia. 1st. That in which the conjunctiva and cornea are affected; 2nd, in which the aqueous humour is the part affected.

Cause.—The cause of specific ophthalmia is undoubtedly due to the entrance of foreign bodies into the eyes, irritation, and septic infection. I have noted after a windy day when the air has been full of small particles of sand, etc., that on the following morning a good many animals were affected with the disorder, most being affected with the first or second forms; but after a very hot day, under the same climatic conditions, animals were often affected with the third and fourth forms of the disease. From what I have said it is quite plain that the first two forms of specific ophthalmia are caused by the irritation of particles of sand and other foreign bodies lodging in the eyes causing some septic infection, the disorder of the cornea being produced by particles of sand and grit striking hard against it and so setting up a septic inflammation. The three last forms are difficult of explanation. I advance the following simply as a theory, namely, that the horse's eyes being weakened by the wind and irritation of the dust are unable to withstand for so many hours the constant glare of the sun, and I cannot but consider it reasonable to think that this great amount of light may add an additional irritation and in some way cause under these conditions structural changes to take place in the aqueous humour of an inflammatory character. It has also been suggested to me by a medical friend that the blurring of the aqueous humour is due to the diapedisis of the leucocyte from the ciliary vessels caused by the intensity of the septic inflammation. I have seldom noticed a Colonial bred pony to suffer from this form of ophthalmia, it mostly occurs in imported horses and those in bad condition.

Symptoms.—In the first two forms I have mentioned there is noted a blinking of the eyelids, or the eyelids are half dropped over the eyes, and there will be a discharge of tears, the upper eyelids are hot, swollen, and painful when touched.

On carefully opening the eyelids (which I advise should be done after bathing the parts with a solution of cocaine to minimise the pain as much as possible) there is noticed great inflammation of the conjunctiva and probably small wounds may be seen on the surface of the cornea and a certain amount of opacity of that covering is observed. The animal will also present general febrile symptoms to a more or less degree according to the severity of the attack.

In the last three forms of specific ophthalmia I have mentioned the aqueous humour is the part of the eye affected. The eyelids in these forms are usually partially closed over the eye, as if the animal were trying to keep out the light, but on examination of the eyes it becomes at once evident that the animal is blind, the whole of the aqueous humour looks like a white opaque mass or assumes a colour exactly similar to that of a dense yellow London fog, or this yellow discolouration may be mixed with red. In the worst cases the red discolouration looks like an extravasation of blood into the aqueous humour (I cannot say that such is the case but it may be). This condition of affairs on the march with a column looks at first alarming, as the idea is that a blind horse had best be shot, but as long as I could get such cases walked with the baggage, I liked to give all a chance of recovery.

Added to the above symptoms those of a febrile nature are much worse than in the first two forms, the temperature may rise as high as 106 F. I look upon these febrile symptoms as evidence of an acute septic intoxication.

Prognosis.—Provided that the case is taken in hand at once, I am of the belief that the prognosis of all forms except the fifth is very favourable. The first two forms are amenable to treatment in from four to six days according to the severity of the attack. The third form passes through two changes before recovery; after about the third or fourth day the white opaque appearance of the aqueous humour looks less dense, and about the sixth or seventh day breaks up into flakes and the pupil again becomes visible. These flakes will disappear about the tenth day and the eyes resume their normal appearance.

In the fourth form, where the aqueous humour assumes a yellow opaque appearance, it first becomes less dense, then turns to white, lastly breaks up into flakes, and then these flakes disappear and the eye becomes normal. This takes from about fifteen to twenty days, and is the most difficult to treat.

In the fifth form, where the aqueous humour in addition to presenting the yellow appearance as above described looks as if the yellow was stained with blood, I have had only two cases under observation. Both animals affected were in such pain that I considered it advisable to have them destroyed. Unfortunately I had no opportunity of examining the eyes after death. This form of the disorder appears to me the very worst, and I should consider that it is practically incurable.

Treatment.—This I will divide into general, for all the forms of specific ophthalmia, and special for the last three forms.

On an animal being noticed to be affected with specific ophthalmia the first thing required is to find out by which form it is affected, by a careful examination of the eyes, first using a cocaine solution to annul the pain of such an examination. The febrile symptoms must be attended to, and I have found the best drugs to give are Epsom salts ʒvi to ʒviii., ginger and gentian *aa.* ʒii. pot. nit. ʒii., repeated every or every other morning as required. As to the eyes, I have tried every eye lotion I could get hold of, such as those of lead and opium, belladonna, zinc sulphate, zinc chloride, nitrate of silver, and the dusting of calomel on the cornea; but these lotions do not seem to be of the least good in the treatment of the disorder. The only lotion that clears the eyes is one made up of a saturated solution of boracic acid in cold water with a dram of belladonna extract added to every two pints. This should be used to wash out the eyes with four times a day. I used to do this by means of a syringe, and at each time I had the eyes bathed for at least five minutes; for bad cases I carried this lotion in my Cape cart and at the halts during the day it was ready for use.

The great thing also to be observed is to keep away the light from the eyes as much as possible and to keep the eyes and surrounding parts cool; this I had done by means of a linen bandage saturated in boracic acid solution fixed into such a position that it covered the eyes. In treating eyes I have often seen a dirty piece of sacking put on as a bandage, but can only point out that anything used for the treatment of a diseased eye should be absolutely clean, if not the disease will become aggravated instead of better.

In the third and fourth forms of the disease an additional or special treatment is indicated, and I can speak from practical experience that without it the aqueous humour will not clear but become worse, namely, a smart iodide of mercury blister 1 to 8 should be well rubbed into the hollow above each eye taking great care that the parts around not required to be blistered are well protected by vaseline, and a piece of cotton wool strapped over the blistered surface to prevent the blister getting upon the eye bandage

If in from six to seven days no change is noticed in the appearance of the aqueous humour, repeat the blister and all will probably go well. I may mention that I have treated at least 150 cases of this disorder, probably a good many more, and can only state that by using the treatment here indicated I have not had to destroy a single horse on account of the blindness not having been cured, with, of course, the exception of the two I have previously mentioned.

General Remarks.—In England I have not seen cases of specific ophthalmia in which the aqueous humour was affected as I have described in this article, but have seen many cases of the first two forms, and often horses left with short sight after the disease. I bought a pair of horse spectacles from Messrs. Arnold and Sons in 1898 for one case of short sight in a horse, the animal shying at the time very badly. These spectacles together with the use of an astringent lotion at night completely cured the animal, and in about four months it was able to go without the spectacles, and was cured of the shying.

I would suggest as the prevention of specific

ophthalmia in South Africa, or as the prevention of a second attack, the use of spectacles for horses made on the same plan as Messrs. Arnold's, but containing slightly smoked plain glasses. I happened to show Mr. Scott, M.R.C.V.S., attached 18th M.I., one of my worst cases of specific ophthalmia and he was as surprised as I was that the case recovered, it took I believe 20 days to do so and had three blisters applied over the eye. I will own that, considering the structural changes that must take place in the aqueous humour in the first place, one is apt to say at once the animal is dead blind and probably incurable, but it comes as a pleasant surprise when the condition gradually disappears and the eyes become normal. I found the great thing to remember in treating was never give up hope of a recovery.

VETERINARY SOCIETIES

NORTH OF ENGLAND VETERINARY MEDICAL ASSOCIATION.

MALFORMATIONS.

By O. Charnock Bradley, M.B.

[Read at the annual meeting held at Newcastle-on-Tyne, on Friday, February 28th.]

Great though the physical changes are in the form of an animal between the time when it makes its appearance in the world and the time when it takes its leave, we may consider them as comparatively unimportant when set down side by side with those through which the organism passes in the weeks or months of antenatal gloom. Although the body alters very appreciably as the animal passes from infancy to senility, the alteration is not one in which the general plan of architecture is interfered with. In the transition from the ovum to the being capable of living outside the mother's womb, the conformation of the organism passes through many and varied stages, stages which follow so fast upon each other that they are appreciable from day to day, in some animals even from hour to hour. In the rabbit for instance, in the short period of thirty days or thereby the single primordial cell has to multiply at such a rate that at the end of that period an animal is produced possessed of complex organs capable of performing most varied functions.

At any stage in the unfolding of the embryo some slight deviation from what is considered normal may take place, and therefore instead of feeling surprise that sometimes an animal is born in an abnormal form we should rather wonder that things do not go wrong more frequently than is actually the case.

Departures from the conventional style of architecture are of all degrees of magnitude. In some cases the variation is so slight as to be of no consequence; indeed it may be possible to overlook it in any other than the most careful examination. In other instances the creature when born it so deformed that life is impossible. Between these extremes occur an infinity of degrees of malformation. It is clear, therefore, that any attempt to distinguish sharply between what are known as monstrosities, anomalies, and varieties would be a matter of some difficulty. For this reason the title of the present paper is simply that of "malformations," and in it will be discussed some of the more common results of disturbance of development, no matter whether these be slight or grave.

Another difficulty meets us when we endeavour to classify malformations. Fortunately a classification is not of paramount importance to us in this place, and therefore we may employ a simple method, though one to which exception may easily and reasonably be taken. Malformations may, in the first place, be divided into (1) those produced by some cause outside the ovum, as for example disease of the uterus, etc.; and (2) those arising out of some inherent defect in the ovum itself. I do not propose to discuss malformations belonging to the first category, as they may be more fittingly considered by a professed pathologist rather than by one whose business is with morphology. We shall concern ourselves with those aberrant forms for which there is no assignable extrinsic cause, as these are the more numerous, and I venture to think the more interesting. Why the ovum should sometimes step out of the beaten track and follow a developmental path of its own is not by any means clear; the subject of teratogeny, or the production of monstrous forms, being one in which much remains to be done. From times too distant to be specified, dreams and maternal impressions generally have been held responsible for modifications in the development of the embryo. It is impossible to say when or how such an idea first arose, but we know that mention is made of it in very ancient writings. It evidently obtained among the ancient pastoral people of the East, for we read that "Jacob took him rods of green poplar, and of the hazel and chestnut tree, and pilled white strakes in them, and made the white appear which was in the rods. And he set the rods which he had pilled before the flocks in the gutters in the watering troughs when the flocks came to drink, that they should conceive when they came to drink. And the flocks conceived before the rods and brought forth cattle, ringstraked, speckled and spotted." (1)

A similar superstition—for we can call it nothing else than a superstition—still obtains among those whose scientific knowledge is little or nothing. It is not uncommon for dog breeders to solemnly assert that the sight of a mongrel at the time of conception has an adverse effect upon the progeny, and instances are often quoted in which the chasing of a pregnant female by a dog leads to the birth of a dog-faced offspring. We can now afford to treat such notions with the "silent smile of slow disparagement," but we must remember that the science of embryology is comparatively young. Before the stages in the growth of an embryo from the ovum were known it was not to be expected that teratology as a science could have any existence. The wonderful and manifold processes which take place within the egg—itself hidden from view so far as mammals are concerned—were unknown until the time of the great Harvey. And even when Harvey did make known his discoveries they were not at once accepted, for a very wonderful theory was revived in opposition to them. The school of Preformationists—as they were called—asserted that Harvey's views, that an animal gradually came into existence from a single cell, were all nonsense. They stated that the egg contained from the very first a perfectly modelled animal in miniature. It therefore followed, according to them, that a germ contained the germs of all subsequent offspring packed away in much the manner of the conjurer's "box within box" apparatus. The Preformationists even went so far as to compute that the ovary of mother Eve contained no less than two hundred thousand millions of such germs! Erasmus Darwin, grandfather of Charles Darwin, made merry over this stupendous calculation. He said "these embryons . . . must possess a greater degree of minuteness than that which was ascribed to the devils who tempted St. Anthony, of whom twenty thousand were said to have

(1) Genesis xxx., 37.

been able to dance a saraband on the point of a needle without the least incommoding each other.

Modern experimental teratogeny gives results which though not affording anything like a complete explanation of the causes of malformations, are nevertheless highly instructive. Fol (2)has observed that when more than one spermatozoon penetrates the egg of the sea-urchin or of the star fish, subsequent segmentation is irregular. In the earlier part of last century Geoffroy St. Hilaire (3) found that partial varnishing of the shell of a hen's egg caused an irregularity in development. Violent agitation of the egg had a somewhat similar effect. Panum (4) and Dareste (5) have observed similar results following a like procedure. They have, moreover, experimented with variations of temperature, and have found that this is very fruitful of malformations. The experiment of varnishing the shell of an egg has been oft repeated, the latest experimenter, as far as I am aware, being Cutore (6) who concludes that the development of the embryo is in inverse ratio to the area of the shell varnished. Marked malformation of the nervous system was produced. Féré (7) has tried the effect of injecting various substances into the egg, and has come to the conclusion that cantharidin, among other drugs, when so used originates a marked tendency to variation. The above examples give one an idea of the methods employed by teratologists, and are useful as showing that abnormalities may be the result of many and varied causes.

Some aberrations, as we shall see later, find explanation in the ancestral history of the animal, that is they are the result of reversion to a more primitive ancestor. Heredity of a more limited extent must also be counted as a cause, some malformations undoubtedly running in families.

When the ovum fails to follow the lines of normal development, it may do so in one of two ways, either structures are developed in a manner in excess of the normal or else development is defective. The first variety of malformations includes a wide range of degrees extending from an extra finger, or some like trivial anomaly, to twins produced from one ovum. That terminal parts have a tendency to divide or dichotomise is well known and examples are frequent, not only in the animal kingdom but also among plants. Botanists are perfectly familiar with dichotomy, and indeed the charm and beauty of form of some leaves depends largely upon this tendency. Among all classes of animals a like condition is frequently shown, for example the rays of the star fish, normally five in number, are often multiplied by dichotomy. Possibly the most common form of dichotomy in mammals is that which results in the production of supernumerary fingers or toes. The process need not stop short at the digital region but may invade more proximal parts of the limbs, and not infrequently animals are born with a superfluity of limbs or parts of limbs the consequence of this reduplicative aberration of development. Most practitioners have, at one time or another, encountered cases in which an animal is born the proud possessor of two heads. Here the dichotomy has affected the anterior part of the body, and may have proceeded to such lengths that practically two beings have been formed joined together by the posterior part of the trunk only. Instead of the fission being anterior it may involve the posterior end of the embryo and a double tail be the consequence. Or the posterior dichotomy may be more marked, and more of the trunk be multiplied until, in extreme cases, two creatures joined together by their heads only are born. Or again, both anterior and posterior dichotomy may have been at work finally producing a double monster in which there is a comparatively limited bond of union between the two resultant creatures. If, then, this process is capable of terminating in such a state of affairs is there any reason to doubt that actual and separate twins may arise in the same way? That twins are so produced is admitted, twins being distinguished as binovular, *i.e.* produced from two ova; and uniovular, those formed from one ovum only. Human uniovular twins are variously estimated as occurring once in five, six or eight of all twin cases, from which it will be seen that they constitute a not entirely negligible part of the population of a country. It is possible to distinguish uniovular twins from the binovular variety by an examination of the fœtal envelopes. Uniovular twins have always a single chorion and a common placenta. In some instances they have a common amnion also, but Ahlfeld is of opinion that this is only found in some 8 per cent. of cases. The two umbilical cords may be entirely separate, or they may join before entering the placenta. It is rather interesting to note that uniovular twins are always of the same sex. As a result of the common placenta, and the consequent vascular communication between such twins, if one o them be more feebly developed than the other a further variety of monstrosity sometimes arises. The heart of the stronger embryo may be capable of sending blood up the cord of the weaker, whose heart being thrown out of work so to speak, atrophies, and may entirely disappear. Hence come those acardiac monsters in which sometimes development has been so impeded that the embryo loses almost entirely all resemblance to a normal animal.

It may be objected that the production of two embryos from a single ovum is a matter of conjecture, at any rate so far as mammals are concerned, for we cannot possibly watch the process of splitting. But the actual process has been observed in more lowly members of the animal kingdom. Kleinenberg (13) made the exceedingly startling and valuable discovery that two embryos may be *normally* produced from one ovum. This he found to be the case in the *Lumbricus trapezoides*, in which worm a single germ gives origin to two embryos, at first connected together but ultimately becoming free. Kleinenberg goes on to assert that in no case has he found a single embryo developed from one egg. For though such cases may appear to occur a careful search will always reveal the remains of a second embryo.

As previously stated dichotomy is, in many instances, responsible for the production of more digits than are normally present. But this is not the only cause of polydactyly, for atavism in some cases at any rate may be considered as the factor. In man, and other animals normally possessing five digits the presence of an additional digit one would naturally set down as an example of dichotomy, for we know of no mammal, living or extinct, in which the number five is exceeded. But there are those who hold that the ancient forms from which the present mammals have descended were provided with seven digits. This is not an entirely new view, but it has been revived within recent years by von Bardeleben (14) and there are now not a few anatomists who incline to accept it, at any rate, as a possibility. Consequently there are those who consider that an extra digit in a normally pentadactyl animal is evidence of reversion. This is a good example of the great tendency that obtains

(2) Comptes Rendus de l'Acad. des Sci., 1877, p. 659.
(3) Propositions sur la Monstruosité, 1829. Histoire Générale et Particulière des Anomalies de l'Organisation. 1837.
(4) Untersuch. uber a. Entstehung d. Missbildungen, 1860.
(5) Comptes Rendus, lxvi., 1868, p. 155. Recherches sur la Production Artificielle des Monstrusités, 1877.
(6) Anatomischer Anzieger, xviii., p. 391.
(7) Comptes Rendus, Soc. de Biol., July 7th, 1900.

(13) Quarterly Journ. Microscop. Science, vol. xix, 1879.
(14) "Hand und Fuss" Verhdl der Anat. Ges. Jahrg. viii., 1894.

at the present time for observers to attribute malformation to atavism if this can by any possibility be done, no matter how the eyes must be closed to obvious facts pointing in another direction. Now in man the gradations in polydactyly are so gentle that anyone not otherwise unreasonably biased must be forced to the conclusion that dichotomy is much more likely to be the cause than reversion. In connection with this question it is only fair to state that quite recently Leboucq (15) has published some observations in which he states that he has found the vestiges of a præpollex and post-minimus in a modern bat (Vespertilio murinus). If seven digits, or even the vestiges of seven digits, can be shown to exist, or to have existed at any time in the life—embryonic or otherwise—of a mammal at present inhabiting the earth, or having formerly done so, then the grounds for assuming that some at least of the cases of polydactyly in man are atavistic will be strengthened.

In those animals not normally possessing five digits, polydactyly offers a somewhat simpler problem. For instance, in the horse it is sometimes possible to come to a conclusion as to whether an extra digit has been produced by dichotomy or is the result of atavism. Variations in the digits of the horse may be divided into two classes. (1) Those in which the large metacarpal or metatarsal bone gives articulation to more than one digit: and (2) those in which the extra digit (or digits) possesses a distinct metacarpal or metatarsal element.

Those cases falling into the first class are readily disposed of, for there can be little doubt that they are simply examples of dichotomy. No known ancestors of the horse, or any other mammal, have had more than one digit connected with a single metacarpal or metatarsal bone. In the cases belonging to this class it is most common to find that the two digits are of about equal size, and possess some resemblance, at least as far as the exterior goes, to the two digits of the ox.

The second class of equine digital variation offers much more difficulty in the solution of the question of cause; and in order to discuss the subject it is necessary to bear in mind some points relative to the condition of the region in the ancestors of the horse. As is well known, the immediate ancestor of the horse—the Hipparion—had three digits, each of which was connected with a metacarpal or metatarsal bone. These three digits were of unequal size, the middle one being much better developed than the other two. In the transition from the Hipparion to the modern horse the two smaller digits disappeared, and their metacarpal and metatarsal bones diminished in size. It is not quite clear whether the two digits aborted simultaneously or not, but it has been suggested that the outer one was the first to leave the scene. Though one usually says that these digits have disappeared, this is to some extent misleading. It would be more accurate to say that they have become very rudimentary, and have lost their independence from the splint bones. Cossar Ewart (16) has shown that if the "button" of a splint bone be examined in the embryo, distinct vestiges of the historic digits can be found.

Now, in considering cases of malformatian we should bear in mind that atavistic variations do not belong to remote ancestral forms, but rather to immediate predecessors. Therefore in the horse those cases of polydactyly which most closely resemble the condition in Hipparion may possibly be atavistic. If there are only three metacarpal or metatarsal bones, and the extra digit articulates with an unusually well developed splint bone, then may we at least suspect atavism. If in such a case the digit bearing splint be on the inside of the limb, this would be further evidence in favour of reversion; for, as stated previously, it is very probable that the inner of the three digits of Hipparion remained longer in existence than the outer, and we should, therefore, expect it to be reproduced rather than the outer. Several cases are on record in which the inner splint is better developed than usual and carries a digit (*e.g.*, Arloing (17), and I am enabled, through the kindness of Professor Ewart, to show a specimen in which the condition is similar.

All those cases of polydactyly in which there are more than three metacarpals or metatarsals, or in which the large bone is divided in part of its length, it would be safer to attribute to dichotomy rather than to atavism.

In addition to the two classes of equine polydactyly just reviewed, Bateson (18) makes use of a third class, viz., that of intermediate cases. Into this class he places those examples where the rudimentary digits are not articulated to any splint bone. When these digits are found on the inside of the limb it is just possible that the "button" of the splint bone has developed beyond the ordinary limits and has become detached. But this view is at best open to question and should be expressed with caution. (19)

In polydactly we have perhaps the best example of the transmissibility of malformations. Medical men are not infrequently consulted as to the advisability of removing a supernumerary digit from the hand of a child, and in very many instances they are told that the malformation is a family peculiarity. Among the lower animals there is not the same opportunity for observing this trait of heredity; but we can scarcely doubt that it exists. Human hereditary polydactylism has been discussed by many writers, but probably the best accounts are found in papers by Struthers (20) and Gregg Wilson (21). The former writer gives an account of the peculiarity in four generations of a family; and Wilson mentions five cases in one of which polydactylism was so common in the family as to be expected.

Among cases in which supernumerary organs occur, those in which there are additional mammæ are not of

(15) "Recherches sur la Morphologie de l'aile du Murin." Libre Jubilaire dédie a Charles von Bambebe, 1899.

(16) *Jour. of Anat. and Phys.*, xxviii., 1894, p. 346.

(17) *Ann. Sci. Nat. Zöol.*, Ser. v., T. viii., p. 61.

(18) "Materials for the Study of Variation." 1894.

(19) The following papers contain descriptions of cases of equine polydactyly:—

von Jhering. *Kosmos*, xiv., 1884, p. 99.
Arloing. *Ann. Sci. Nat. Zöol.*, Ser. v., T. viii., p. 61.
Cornevin. *Nouveaux cas de Didactylie chez le Cheval* Lyons, 1882.
Kitt. *Deut. Zeitschr. f. Thiermedecin.*, xii, 1886.
Marsh, O. C. *Amer. Jour. Sci.*, xliii., 1892, p. 349.
Catalogue Mus. Coll. Surgeons, Eng.
Wehenkel, J. M. *Jour. de la Soc. et des Sci. Med. roy. Nat. de Bruxelles*, 1872.
Pütz. *Deut. Zietschr. f. Thiermed.* xv., 1889, p. 224.
Mojsiscovics. *Anat. Anz*, iv. 1889 p. 255.
Wood-Mason, J. *Proc. Asiat. Soc.*, Bengal, 1871, p. 18.
Geoffroy St. Hilaire. *Ann. Sci. Nat.* xi., 1827, p. 224.
Bredin. *Froriep's Notizen*, xviii., p. 202.
Franck. *Handb. d. Anat.*, Stuttg., 1883, p. 228.
Ercolani, G.B. *Mem. della Acc. Sci. d. Istituto di Bologna* s. 4, t. iii., 1881, p. 760.
Boas, J. E. V., *Deut. Zeitschr. f. Thiermed.*, vii., p. 271.
Parker. "Supernumerary Digits," *The Veterinary Record*, June, 1901.
Joly. *Comptes Rendus*, 1860, p. 1137.
Joly and Lavocat. *Mem. de l'Acc. des. Sci. de Toulouse*, s. 4, t. iii., 1853, p. 364.
Goodall. *Journ. Comp. Path. and Therap.*, vol. viii.
Shave. *Jour. Comp. Path. and Therap.*, vol. vii.
Taylor, Hy. *The Veterinary Journal*, vol. lviii., 1901, p. 344.
Briot, A. Cas de polydactylie chez un cheval. *Compt. Rendus. Soc. Biol.* Paris; Ser. 10 T. 5. No. 15. p. 460.
Delplanque. *Mem. Soc. centr. d'Agric. du Dep. du Nord.* s. 2. x. 1866-67, p. 295.

(20) "On Variations in the number of Fingers and Toes. *Edin. New Phil. Journ.*, new ser., July, 1863.

(21) *Journ. Anat. and Phys.*, vol. xxx, p. 439.

least interest. The normal number and position of mammary glands differs greatly in different animals. As a rule, however, they are arranged regularly and symmetrically along two lines—the mammary lines—running on each side of the ventral aspect of trunk. The greatest number of glands is usually stated to be fourteen pairs, and in such cases they occur throughout the whole length of the mammary lines. But the number of functional glands may be very much fewer, For instance, in man, horse, sheep, etc., the number is only two. The position of the functional glands in man, dugong, sloth, manatee, and monkeys is pectoral ; in the mare, cow, sheep, goat, deer, and antelope, they are inguinal ; and in the dwarf lemur (*Microcebus Smithi*) which has three pairs of glands they are pectoral, thoracic, and inguinal in position. The most instructive cases of supernumerary mammæ. are those occurring in animals with normally few glands. In man only very few examples (less than 10 per cent. according to Leichtenstern (22)) of supernumerary glands are found above the normal site ; most of them being below and internal to the conventional organs. The extent to which these accessory structures are developed is very variable, ranging from an actually functional gland to a mere wart-like nipple with no glandular tissue whatever. The possession of additional mammæ is not by any means confined to the female ; they are present very frequently in the male.

Mitchell Bruce (23) gives some very interesting figures showing the frequency of mammary variation. He took the patients in the Brompton Hospital for Consumption and found in 2311 females 14 cases (·605 per cent.) and in 1645 males 47 cases (2·857 per cent.) These persons were not specially examined with a view to statistics, but out of 315 persons examined for such a purpose 24 cases were found, 19 male and 5 female. I have quoted these figures because they bring out a rather remarkable point, viz., that additional mammary organs are more common in the male than in the female.

Among domestic mammals the cow affords good and frequent examples of polymastia. The occurrence of additional teats which may or may not be perforated by a duct and which may or may not be capable of giving milk is well known to all having anything to do with cattle. In the majority of cases the extra teats are placed behind the normal glands, but examples are not unknown in which they have been found in front of the usual organs. Very frequently the rudimentary structures are two in number and are symmetrically disposed, but sometimes only one is present this being always to one side of the middle line. The occurrence of three extra teats is not so common.

It is well known that the number of glands is very variable in those animals, such as the pig, dog, and cat, in which they occupy the whole of the mammary line. As a rule, however, whatever the number of glands may be they are arranged in pairs, the members of the same pair being placed at the same level. But this rule is often departed from, and examples are not far to seek in which the number on the two sides is not equal. When this is the case the arrangement lacks symmetry. In connection with this point, Bateson (24) examined 35 young pigs, and found that of these 19 had the same number of glands on the two sides of the body, but two of them had an altogether irregular arrangement, the remaining 17 having them regularly arranged in pairs. The rest of the 35 animal had the number of glands on one side unequal to that on the other.

The question of how supernumerary mammæ or nipples come into existence is an interesting one. According to observations made upon the embryos of several mammals by Schultze (25) there is a ridge running along the dorso-lateral aspect of the embryo on each side. These are the mammary lines, and nipples and mammæ appear at definite points along them. As the growth of the embryo proceeds the mammary lines come to occupy the ventral aspect of the body. It appears that functional mammæ may develope all along the mammary line or only in certain situations. In the mare, sheep, cow, goat, etc., the glands which develope normally are few in number and inguinal in position ; but occasionally those parts of the mammary line which should remain dormant take on an unusual developmental activity and supernumerary mammæ result. One will be prepared to hear that polymastia has been more than once set down as an example of reversion towards an ancestral form in which the whole mammary line produced glands. But in this case, as in polydactly, it is well not to be too dogmatic.

The foregoing examples of malformation are all instances of excessive development, but defective development is not less fruitful in the production of abnormalities. Some of the most striking and repulsive monsters are produced in this way. A not uncommon slight malformation is seen in an unusually large umbilicus with the protrusion of a coil of intestine into the umbilical cord. This, however, is a comparatively slight deviation from the normal in which the body walls have not fused as perfectly as should have been the case. The defective fusion may be so great that there is a cleft extending throughout the length of the ventral aspect of the abdomen. The abdominal viscera, in such cases, are found more or less outside the body and produce confusion in the mind of the unsuspecting practitioner who has occasion to introduce his hand into the uterus of the mother. The fissure in the body wall need not stop at the limits of the abdomen but may extend into the thorax as well, when the thoracic, as well as the abdominal organs, are ectopic. Watson (26) has described an extreme case in *The Veterinarian* in which the whole body cavity was open, as he says, from the neck to the anus. In addition the body was so malformed that the skin was on the inside and the viscera outside.

As a variation of this defect the abdomen may be closed in the normal way, but the sternum and the superjacent structures are fissured. In such examples it is not uncommon to find the heart outside the thorax—a condition obviously incompatible with life.

Probably the most common examples of defective development are found in connection with the face. As is now well known, thanks to the observations of His, the face of a mammal at one stage of its embryonic existance may be truly said to consist of an "open countenance," there being merely a common opening from which certain fissures radiate. This opening is gradually converted into a nose and a mouth by the growing together of a number of processes, of which the fronto-nasal and maxillary are concerned in the formation of the upper lip. The mouth has, at first, a very defective roof, there being a considerable communication between it and the cavity of the nose. This is remedied by the growth of the palatine processes of the maxillæ, which growing towards the middle line there coalesce with each other and with the nasal septum. In this way the mouth is separated from the nasal cavity and the nasal chambers from each other. It is evident that here there are many chances for development to fall short of its usual fulfilment.

Possibly the commonest defect is the one known as hare-lip, in which the fronto-nasal and maxillary processes have failed to unite completely. It is clearly obvious, from the mode of development, that hare-lip

(22) *Virchow's Arch. f. Path. Anat.*, lxxiii. 1878, p. 222.
(23) *Jour. Anat. and Phys.*, xiii., 1879, p. 425.
(24) Op. cit.
(25) *Anat. Anzieger*, vii, 1892, p. 265.
(26) Vol. xliv.

may be either on one side only or on both sides ; and further that the cleft in the lip may be either slight—nothing more than a notch—or of considerable depth, even extending into the nose. Single hare-lip is probably more common than the double variety ; and in man statistics show that, for no known reason that I am aware of, single hare-lip occurs twice as frequently on the left side as on the right.

Defective growth of the palatine processes and consequent failure of union in the middle line results in cleft palate, in which the roof of the mouth is more or less deficient. Cleft palate and hare-lip may be found together, or they may exist apart from each other ; indeed cleft palate may involve the soft palate alone, the anterior part of the palate being perfectly formed. It seems not improbable that there is a hereditary tendency to hare-lip and cleft palate, but it is difficult to come to any conclusion upon the point so far, at least, as the domestic animals are concerned.

At an early stage in the development of the mammalian embryo there are four slits—known as the branchial or visceral clefts—which pass from the exterior of the neck into the pharynx. In fishes these slits are permanent, and of importance in respiration because gills are developed in connection with them. In mammals the first of the four clefts becomes converted into the tympano-eustachian passage, and an external ear is developed from a number of tubercles around its external opening. The remaining clefts normally disappear in mammals, but sometimes the closure of a slit is imperfect. It is not uncommon to find children with small holes along the anterior border of the sterno-mastoid muscle. Into these openings a small probe can often be pushed for some distance ; even in some cases into the pharynx. The existence of a communication between the exterior and the pharynx is sometimes demonstrated by the oozing of milk from the external orifice when the child is sucking. Such cases are known as complete cervical fistulæ, in contradistinction to the incomplete variety in which the passage does not extend all the way from the surface to the pharynx. Instead of fistulæ, appendages bearing some remote resemblance to the normal auricle —and therefore called cervical auricles—are met with. Unfortunately there is not so much known of these cervical malformations in domestic animals as in man ; but Heusinger (27) has pointed out that cervical auricles are not uncommon in pigs ; and that cervical fistulæ are often present in the horse, their secretion soiling the hair and so leading to their detection.

Schmalz (28) states that cervical auricles are common in Merino sheep ; and Viborg (29) describes the sheep of the Wilster Marshes as having a pair of these appendages each as large as an acorn. It appears also that cervical auricles are very common in goats. The exact connection between cervical fistulæ and cervical auricles is not very clear, as comparatively little has been done in reference to the subject. If, however, the normal auricle developes in connection with the first cleft, it seems just possible that secondary auricles may develope in connection with the other clefts. The hypothesis is at any rate alluring.

Turning from the anterior to the posterior end of the alimentary canal we find other examples of defective development. In the early stages in the development of the embryo the posterior part of the alimentary canal—the hind-gut—ends blindly, having as yet no communication with the exterior. The epiblast in the position of the future anus becomes invaginated towards the blind end of the hind gut ; this anal invagination being known as the *proctodœum*. The septum between the proctodœum and the hind-gut becomes absorbed, and in this way the posterior opening of the alimentary canal is formed. The opening is, however, at first common to both the alimentary and uro-genital organs, the separation between the permanent anus and the uro-genital orifice occurring at a later date in all mammals above the Monotremes.

The simplest form of malformation produced by defective development of this region is that of *atresia ani simplex*, where the septum between the alimentary and uro-genital passages has been formed, but the anus has remained imperforate. This is apparently not at all an uncommon condition, and in many cases it is possible to make an artificial anus, and all goes well. In other cases the end of the alimentary canal is too far removed from the anal dimple to allow of successful surgical interference.

A more complicated condition is that known as *allantois cloaca* which is practically the complete persistence of the embryonic condition. The septum between proctodœum and hind-gut has remained intact, and the partition between the gut and the uro-genital passage has not been developed.

Other varieties of malformations are those of *common open cloaca* and *atresia ani urethralis*. In the former condition the parts are in the state found in the Monotremes, *i.e.*, a cloaca has been formed but there is no separation of alimentary and uro-genital tracts. In atresia ani urethralis the gut opens into the urethra (sometimes into the bladder) and meconium finds its way out by the external urethral orifice. A case of this kind occurring among domestic animals is described by Mathieu (30).

Some examples of defective development of the central nervous system are sufficiently common to be touched upon here. The primary brain consists of an arrangement of three vesicular distensions of the neural tube. The first and most obvious change which occurs in this elementary brain is the outgrowth of a hollow protrusion from each side of the most anterior of the three vesicles. These outgrowths develope eventually into the optic nerves and their expansions—the retinæ. If the primary cerebral vesicle remains undivided an animal possessed of only one eye is the consequence. This monster is known as a Cyclops from its resemblance to the fabled race of Greek giants who had only one circular eye set in the middle of the forehead, one of whom, according to Homer, was overcome by Ullysses.

Judging from the conclusions of Phisalix (31) who has carefully examined cyclopic domestic animals, a condition of complete cyclopia, *i.e.*, one in which a single perfect eyeball is present, is somewhat rare. The incomplete variety, in which the single eyeball contains two crystalline lenses, is much more frequent.

Further, defective development of the brain may lead to its partial or complete absence. Most frequently only the anterior part of the brain is wanting. I have examined two such specimens in the calf, and in both of them the cerebellum was defective and the brain anterior to the crura cerebri entirely absent. So long as the medulla oblongata is present it appears to be possible (for the creature to breathe and maintain an existence separate from the mother for at least a time.

Last session I had a very interesting pig embryo sent to me in which, in addition to an entire absence of brain, there was no spinal cord anterior to the 9th thoracic vertebra. I need not say that the creature had not been able to breathe. In such anencephalic monsters the cranium and sometimes the face also are not perfectly formed. In one of the calves just mentioned there was a most pronounced condition of hare-lip and cleft palate, indeed, with the exception of the lower jaw, the face could hardly be said to exist at all.

(27) *Deutsche Zeitschr. f. Thiermedicin*, Bd. ii, 1878.
(28) *Thierveredlungskunde*, p. 223.
(29) *Samtl. Vet. Afhandl.*, i., p. 148.
(30) *The Veterinarian*, 1852.
(31) *Journ. de l'Anat. et de la Phys.*, T. 25, p. 67.

In the short time at our disposal we have been able to do no more than take a very brief view of some of the more common malformations. Many very interesting varieties could not be even touched upon, and those which have been mentioned have not been made to yield all the information it is possible to extract from them. Still, imperfect as the review has of necessity been, it is hoped that it may have been made evident that, repulsive though monsters often are, they are not unworthy to find a temporary or permanent habitation in the laboratory instead of on the dunghill, as, it is feared, is only too often the case.

(The paper was illustrated by means of limelight views.)

Discussion.

Mr. G. E. Gibson (who opened the discussion) described cases of atresia ani in lambs, which had come under his notice and which he had successfully treated. Also a case of curvature of the spine in a brood mare, and whose progeny was affected in the same manner.

Mr. W. Hunter mentioned a case of multiplicity of limbs in a foal, and also a case of ectopia ventriculi in a calf, and the methods he adopted for bringing about delivery in these cases.

Mr. H. S. Elphick mentioned a case of malformation in a calf of the bull-dog type.

Dr. Armstrong mentioned cases of malformation in grayling and other fish, which had incidentally come under his notice.

Dr. De Jong spoke of the removal of supernumerary digits, etc., in children.

Mr. Chivas mentioned a case of double-headed monstrosity in a calf, a case of spinal curvature in a mare, also a case of "ectopia cordis" in a calf in which the heart was situated well up in the cervical region. Also cases of atresia ani in lambs, and his method of treatment.

Prof. Bradley, in reply, said that he was highly gratified by the manner in which his paper had been received, and by the interesting discussion it had evoked.

A vote of thanks proposed by the President to Prof. Bradley for his kindness in preparing and reading his paper, and a vote of thanks, proposed by Mr. Hunter and seconded by Mr. Chivas, to the President for his address, concluded the meeting.

WESTERN COUNTIES VETERINARY MEDICAL ASSOCIATION.

The 19th Annual General Meeting was held at the "New London" Hotel, Exeter, on Thursday, March 20th. The President (Mr. R. E. L. Penhale, Torrington), occupied the chair, and there were also present Messrs. W. H. Bloye, P. G. Bond, Plymouth; E. W. Bovett, Bridgwater; W. Brown, Wiveliscombe; J. A. Collings (Hon. Assoc.) Exeter; H. W. Davie, Crediton; G. W. Elder, Taunton; C. H. Golledge, Sherborne; J. P. Heath, W. Roach, Exeter; W. Penhale, Barnstaple; E. J. Thorburn, Okehampton; and Wm. Ascott, Bideford, Hon. Sec.

Correspondence.

Letters and telegrams regretting inability to attend were received from Messrs. A. J. Down, Sampford Peverell; G. H. Gibbings, Tavistock; W. G. Gillam, Minehead; G. W. Haydon, Midsomer Norton; C. Parsons, Launceston; W. Penhale, Holsworthy; and Prof. Penberthy, R.V.C., London.

A letter from Mr. Hunting was also read saying he was very sorry he was unable to be present, having been unexpectedly called to Saxony on business he could not put off, and asking that someone would read his paper for him. The Hon. Sec. said on receipt of Mr. Hunting's letter he had asked Mr. Bloye to read the paper for Mr. Hunting and he had kindly undertaken to do so.

A letter was also read from Mr. Dixson, Alphington, Exeter, resigning his membership of the Association.

Treasurer's Report.

The Hon. Treasurer, Mr. P. G. Bond, then read his Annual Report and Balance Sheet, which, on the motion of the President, seconded by Mr. Golledge, was received and adopted. It was also decided to have the balance sheet printed and circulated for the information of those members who were unable to be present.

The Treasurer in his report having drawn attention to the arrears, which exceeded considerably the amount of subscriptions paid, it was moved by Mr. Penhale, Barnstaple, seconded by Mr. Davie and carried unanimously "That notice be sent to those members whose subscription are three or more years in arrear that unless such arrears are paid before the next meeting their names will be brought forward at that meeting for discussion."

The Treasurer also drew attention to the heavy expense incurred in engaging a reporter for every meeting. He thought it was only necessary on special occasions, such as the annual meeting, or when some business out of the ordinary was likely to be transacted. In addition to the expense, in his opinion the presence of the reporter tended to hinder discussion, and this was really more important than the expense. At any rate the Hon. Sec. volunteered to do without a reporter at the last meeting and the excellent discussion which ensued he thought strongly supported his opinion. He therefore moved "That the engaging of a reporter be left to the discretion of the Hon. Sec." The President seconded the motion and it was carried unanimously.

Election of Officers.

President.—Mr. Penhale, Barnstaple, said he rose with great pleasure to propose a gentleman as President for the ensuing year whose name he felt sure would be acceptable to all, he referred to Mr. Roach, Exeter, who had been a member of the Association from its beginning, had been a regular attendant at the meetings and had quite recently read them an excellent paper.

Mr. Elder said he had great pleasure in seconding the nomination He had every confidence Mr. Roach would carry out the duties of the office with credit to himself and the Association. The motion having been carried unanimously Mr. Roach said he appreciated the compliment very highly and although very diffident of his ability, promised to do all in his power to maintain the dignity of the honourable position to which he had been elected.

Vice-Presidents.—On the motion of Mr. Bloye, seconded by Mr. Bond, the retiring President, Mr. R. Penhale and Messrs. Golledge, Down, and Thorburn, were unanimously elected Vice-Presidents.

Hon. Treasurer.—On the motion of the President, seconded by Mr. Elder, Mr. P. G. Bond was unanimously re-elected Hon. Treasurer.

Hon. Secretary.— Mr. Bloye in very complimentary terms proposed the re-election of Mr. William Ascott. Mr. Roach seconded the motion, which was carried unanimously.

Alteration of Number of Meetings.

Mr. Wm. Penhale, Holsworthy, not being present, the President on his behalf introduced for discussion the motion, notice of which had been given at the previous meeting, viz., "That the Association meet twice instead of three times a year." After considerable discussion however it was resolved to give the three meetings a further trial.

Annual Registration Fee.

Mr. Gillam not being present, the following motion,

notice of which had been given by Mr. Gillam at the previous meeting, was read. "That in the opinion of this Association it is time the Council of the R.C.V.S. instituted an Annual Registration fee of not less than 10/6 per member, thus assuring to the R.C.V.S. an income that would better enable them to look after the interests of the profession." The members however were unanimously of opinion it would be better to postpone any discussion on so important a question until the Council brought forward their scheme having the same object in view, it being understood the Council had some such scheme under discussion.

PLACE OF NEXT MEETING.

On the motion of Mr. BOND, seconded by Mr. BROWN, it was decided to hold the July meeting at Plymouth.

BRUISES OF THE HORSE'S FOOT.

Mr. BLOYE then read Mr. Hunting's paper. [This appeared in *The Veterinary Record* of March 22, p. 592.]

DISCUSSION.

Mr. PENHALE, Barnstaple, said the thanks of the members were due to Mr. Hunting for his excellent paper, which although perhaps not open to much discussion was a very practical and very interesting one. Serous abscesses on the quarters of horses were more common in London than in country practices, but in the latter we had a good deal to do with serous abscesses on the soft shoulders of young horses, due to pressure or bruises from the collar, and he agreed with Mr. Hunting in opening them, finding that very little if any suppuration ensued if an antiseptic solution was injected after. The commonest cause of corns in agricultural horses was the absurd length of time the shoes were retained without removing. He did not think the short shoe altogether a satisfactory reason for the prevalence of corns in hunters. There was a counter reason why hunters ought not to suffer from corns, viz., the nature of their work, which was mainly done on soft ground. In his practice by far the greatest sufferers from corns were the posters, and the short shoe did not cause corns in them as they were generally shod fairly long.

With regard to poulticing, he expected the majority of us poulticed more than Mr. Hunting appeared to think right. He himself was in the habit of poulticing until the wound was cleansed, taking care to have the poultices frequently changed and the foot well disinfected. He was very grateful to Mr. Hunting for his trouble and very much regretted his absence.

Mr. BROWN said he did not agree with many of Mr. Hunting's arguments. First, with regard to the danger of opening the foot. He did not think there was any comparison between an opened foot and a compound fracture. For his part he would open the foot all round to satisfy himself as to the presence or otherwise of matter rather than run the risk of missing it, and he did not think with proper precautions there was much danger or risk of septic infection in so doing. Neither did he believe smiths were so far wrong as Mr. Hunting would have us believe in paring out a corn each time of shoeing. In his opinion it was the right thing to do with a view to effecting a cure. He also entirely disagreed with Mr. Hunting's views on poultices. He thought nothing could be better than antiseptic poultices. The only drawback to their use was their liability to septic influences if not changed frequently, but it was our fault if we allowed them to become septic. He agreed with Mr. Hunting that shoes were the principal factors in producing corns. He knew horses that had been worked without shoes for years and they never suffered from corns.

Mr. BOND hoped Mr. Hunting would have mentioned piped corns which he did not think were caused by bruises from the shoe, but arose from pressure of the wall which curled inwards and pinched the soft parts between the wall and the frog in those feet in which the smith had been in the habit of trimming and cutting away the frog, thus depriving the outer portions of their usual support. He had a typical example of what he meant at home in the foot of a tram horse which had recently been accidentally killed. He had intended bringing it with him but forgot to do so. He understood the shoeing question in South Africa was a very big one, the Boers owing much of their mobility to their custom of doing without shoes, or at the most very light ones, whereas our horses were much hindered by the necessity of carrying the usual shoeing appliances. With regard to fitting shoes so as to give each part of the foot its proper bearing, his instructions to the smiths who shod the tram horses were to fit the shoe so as to have the frog level with the ground surface of the shoe. This gives the frog sufficient bearing to prevent contraction of the heels. The length of time between removing shoes was not always a certain factor in producing corns. If it were the majority of the farm horses would have corns, as very commonly in his neighbourhood they were only removed once a quarter and newly shod twice a year. He knew several that were only shod twice a year and yet they hadn't any corns. With regard to paring the foot, he believed, if one decided to open the foot, in cutting away enough. It was all very well to avoid paring as much as possible where one could see a case as often as one liked, but it would not do in a country practice where the distance generally precluded frequent visits, not only on account of time but also on account of expense. He quite agreed with Mr. Hunting on poulticing. He never poulticed after opening the foot, but packed the parts with cotton waste soaked in a solution of salicylic acid. Not long ago he had a very curious case of bruised foot in which, having located the seat of injury, he made two longitudinal cuts about ¾ inch apart in the wall at the side of the foot, removing the intermediate horn, and after some little while he removed quite a large piece of the pedal bone which had sloughed off. This was followed by the bulging of a growth about as large again as a walnut to which he applied the actual cautery, and the case eventually made a good recovery. He had enjoyed the paper very much, and thought they were all very much indebted to Mr. Hunting. He regretted very much his absence. Had he been present he should have asked him to explain the prevalence of tetanus after wounds in the foot.

Mr. ELDER said we still had a lot to learn as to the causes and cure of corns. He thought fine shoeing on the inside of the foot being so general might account for many, but was not sufficient to account for the preponderance of corns occurring on the inside of the foot. For instance cart horses were generally shod as coarse on the inside as on the out and yet they suffered from corns on the inside more than on the out. He thought therefore there were other reasons and he would mention one probable one. Smiths were a very strong, muscular set of men, and he had noticed, and so had we all, it was almost the invariable custom after cutting the clenches on the outside to seize the shoe on the inside with the pincers and wrench or lever it off by applying pressure just at the seat of corn. The clenches on the inside were not as a rule so carefully cut as on the out and this increased the force necessary to wrench off the shoe. This habit was so universal that he believed in many cases the foot was bruised in this manner. Pipe corns in his experience invariably opened on the ground surface, and he believed were generally caused by grit getting under the shoe. If they were caused as suggested by Mr. Bond they would surely open out on the top. Not removing the shoe often enough was undoubtedly a frequent cause of corn. Going back for a moment to the custom of fine shoeing on the inside. This was commonly

done by smiths to avoid brushing. This he thought was an erroneous idea, as horses brushed with the toe of the shoe and never with the heel. With regard to paring he never lost any time in so doing if at all suspicious of pus. After opening the foot he only poulticed in cases of very severe pain, relying rather on antiseptic tow, and he got the shoe on again as soon as possible. He should have liked Mr. Hunting to have touched on bruises or corns caused by over-reaching, which were very intractable.

Mr. ROACH had listened to the paper with great pleasure. It was very practical and full of interest. He must say he favoured paring freely when paring was required, although he agreed with Mr. Hunting we ought to be as conservative as possible. He was also in the habit of poulticing for a few days after giving exit to pus. He was in favour of easing the heels of feet with corns and thought it was beneficial if properly done. Like Mr. Elder he should very much like to have heard more about corns caused by overreaching, and was very sorry Mr. Hunting was unable to be present

Mr. GOLLEDGE said he should like to add his tribute of thanks to Mr. Hunting for his interesting and practical paper. It was on a subject about which we all knew something, or thought we did. He liked paring out the foot properly and soon in order to know definitely the extent of the mischief. Improper fitting was undoubtedly the cause of a large proportion of corns. Short shoeing had been very much abused but he should like to know what good was supposed to be done by prolonging the shoe beyond the line of the foot. He did not believe wrenching off the shoe, as suggested by Mr. Elder, was often the cause of corn. With regard to the shoe he favoured a three-quarter shoe or one well seated over the bruise.

Mr. COLLINGS said he had listened as an old stager with a great amount of interest to Mr. Hunting's admirable paper. In the ordinary practitioners routine no class of case was so important as that dealt with by the paper. It was so very common and he supposed the commonest form of injury to the foot they were called upon to treat was that caused by nails. It was important to differentiate between an actual injury to the sensitive parts and that which was commonly called a gall. A gall may not cause lameness for some days, but in his experience when lameness did set in it was apt to be a much more tedious affair to treat than an actual prick. In such cases there was often no serum nor any pus to be found, and what was to be done? Don't be too rash in paring, particularly in digging, which was an operation which really required a considerable amount of skill, and unless practised by an adept was apt to defeat its object, viz. searching, by drawing blood and thus obscuring one's view. He believed too much paring and digging was practised and the fungus like growth which in consequence so often ensued was often more tedious to treat than the original injury. It was well to be conservative, but these cases required a considerable amount of judgment. Pus ought not to be allowed to break out at the coronet. If it did the client was dissatisfied and the practitioner's reputation suffered. His experience used to be that clients would much rather have a big hole at the bottom than see pus bursting out at the top, and consequently the practice of paring was much abused. With regard to the cure of corns he was sure he had seen many cases where judicious paring had in time removed all traces of corn.

Mr. HEATH said he thought the two great causes of corns were want of attention to removing the shoes and change of work from soft to hard ground. Of these two causes he thought the latter the most fruitful source.

Mr. ASCOTT was glad they had had such an excellent discussion and he would not occupy the time of the meeting very long. The advantage of paring the foot over digging was not so much because of the liability to hæmorrhage obscuring the view in digging as because it removed pressure on the sensitive parts around the injury and did away with the swelling of the soft tissues which often protruded after digging and was mistaken for a morbid growth. With regard to poulticing, his general rule was to poultice as long as there was severe pain, but he was always careful to have the poultice mixed with an antiseptic, and to have it changed twice a day. As soon as the acute pain was lessened he adopted the packing method. He quite agreed with Mr. Hunting with regard to easing shoes. He much preferred benching the wall over the seat of corn. Three-quarter shoes were of very great service and enabled many horses to work free from lameness that would go lame in any other kind of shoe. Referring to Mr. Elder's remarks on brushing, horses did not always brush with the toe of the shoe, for he had a horse in his own possession which brushed with both heels if not shod fine inside.

Mr. BLOYE then, on Mr. Hunting's behalf, replied to the discussion and said he wished to identify himself with Mr. Hunting's paper. The old saying "once a corn always a corn" was unfortunately only too often a true one. We may change smiths and be as careful as possible and yet the fact remained that there were many corns we couldn't get rid of. Corns were not always the result of errors in shoeing, for he knew himself an unbroken colt which had two very bad corns. He knew that some people firmly believed the mathematical theory that the inner heel being more directly under the line of gravity therefore the inner portion of the foot and limb received greater pressure than the outer. He believed the way in which horses go favoured the production of inside corns. With regard to treatment he quite agreed with Mr. Hunting, but he wished to explain that Mr. Hunting did not object to paring or poulticing. His point was that both required much more care and discrimination than was commonly observed. Poultices were very apt to become septic and favour suppuration. If there was pus he believed in paring and antiseptic pads. If pus appeared at the coronet his practice was to open freely at the top and at the bottom. The great objection to easing was that the front parts being fixed, the back parts stretched and caused great pressure at the point of contact. Spongy corns were very tedious to treat, they were arrived at very quickly when paring. In those cases if such a shoe could be fitted he found great benefit from benching wall from some little distance in front of the corn, but allowing the shoe to bear again at the extreme point of the heel at the inflexion. Going back for a moment to the causes of corns, he should think it quite probable that some of the bruises were caused in the manner suggested by Mr. Elder, by the habit smiths had of wrenching off the shoes. There was a very good reason why wounds in the feet should so often be followed by tetanus. Manure and the dust and dirt so common to the stable was found to be almost invariably swarming with tetanus bacilli, and the foot being so much in contact the result was only natural. He was very sorry Mr. Hunting had not been able to be present to reply to the discussion, he would have done so in a much more able manner and doubtless would have made it much more lively for his critics.

The PRESIDENT moved, and Mr. Roach seconded, and it was carried unanimously, "That the best thanks of the Association be tendered to Mr. Hunting for his paper, and to Mr. Bloye for reading it."

A very successful meeting was then brought to a close with a hearty vote of thanks to the retiring President.

After the meeting the members dined together, the new President occupying the chair.

WILLIAM ASCOTT, *Hon. Sec.*

VIVISECTION.

A long controversy in *The Times* has taken place on this subject. Both sides have had their say and this is the judicial summary of the Editor. It is our reply to Mr. Hurndall:

"It is matter of common knowledge that, at one period, when experiments were performed in this country without legislative or official control, things were done which it would have been difficult or impossible to defend; and hence it was that the anti-vivisectionists of those days had some ground for their complaints, and were able to adduce reasons for the intervention of Parliament. This intervention was brought about by their arguments; and, although at the time there was some fear lest the right of experimentation should be injuriously curtailed, we believe that this fear has not in any important degree been realised, and that the great majority of English physiologists are, on the whole, satisfied with the conditions under which they work. They generally admit the necessity of preventing abuse of the privileges which they possess: and they feel some satisfaction in the knowledge that any such abuse has been rendered well-nigh impossible. No laws are altogether faultless; but those under which experimentation on living animals is now conducted are of such a character as to afford all attainable protection to the animals themselves, and should equally afford protection to the operators, who neither break the law nor desire to do so, and who may rightly demand to be shielded from the vituperation which the anti-vivisectionist societies pour out upon them so freely. The societies, in fact, try to persuade the public that acts which are now forbidden by the law, and which they have never in any single instance shown to have been done in contravention of it, are matters of ordinary practice in laboratories; and this misstatement seems to underlie the whole of their contention and of the proceedings by which it is maintained. The people concerned are usually so entirely unscientific as to have only a very imperfect comprehension of scientific phraseology, and their education and pursuits have seldom been of such a nature as to train them into habits of correct thinking or of verbal accuracy. They are liable to fall into gross blunders by using technical expressions in a colloquial sense; and, when these blunders are pointed out, they neither understand the correction nor see where they have gone wrong, and so often persist, in a way which to better instructed people seems disingenuous or even designedly mendacious, in repeating the error into which they have fallen, or, more frequently, into which they have rushed. They have recently furnished an example of this kind by failing to understand the meaning of the words applied to the successive stages of anæsthesia, and by supposing that pain would be felt whenever it was technically "incomplete."

We cannot but think, however, that the physiologists, and the great majority of sensible folk who appreciate their labours, attach a good deal too much importance to the denunciations of Mr. Coleridge and his followers. These people occupy, in our estimation, something of the same sort of position, in respect to public opinion, that was occupied by the peace-at-any-price party in 1854, or that is occupied by the pro-Boers to-day. They are insignificant in every sense—numerically, intellectually, and practically; and the nation as a whole, fully aware of the importance of experiments which have disclosed the nature of such diseases as the malarial and yellow fevers and of cholera, not to mention many others, and have pointed out the way in which they may be held in check, would certainly not tolerate any legislation by which new or serious impediments were placed in the way of scientific inquiry. The public demand, and righteously demand, that the employment of animals shall be freed from any stain of avoidable cruelty; and all who really investigate the question are well aware that this is accomplished in the laboratory, not only as well as, but even far more than, it is in the railway truck or in the slaughterhouse, not to speak of that rather sore subject, the "big shoot." Even if they had any case, the opponents of experiment would destroy it by their habitual exaggeration and inaccuracy. It matters not to which of their assertions we turn, it will usually be found to be greatly in excess of any evidence which can be adduced in its support, and, very often, either to be altogether groundless or at best to apply only to some foreign country or to some past time, although brought forward and pressed into the service as if it were applicable here and to-day.

"HORSES ON BOARD SHIP."

Previous to the war in South Africa there was a good deal of useful knowledge about horses on board ship, but unfortunately it was confined to a few men. In the ordinary business life of commercial men an affair like the South African struggle would have at once suggested the search for and the employment of those men who had knowledge. The ways of the War Office are otherwise, and consequently thousands of horses were collected, shipped, and ill-treated on landing, by military men who had no experience of the matter. In the book before us—by Capt. Hayes—is a full exposition of the subject, written with knowledge, systematically arranged, and lucidly expressed. If the directions in this book had been followed by the War Office it is impossible to estimate the saving of money and the increased efficiency of our Army which would have resulted.

Very full descriptions are given of horse-carrying ships and of the best arrangements for horses on board. The practical details of stalls, tying up, foothold etc. are minutely gone into, and it is these which prevent accident and trouble.

Ventilation, feeding, watering, grooming etc. are all concisely and practically discussed. The proper methods of embarking and disembarking are explained, and "Precautions after Disembarking" are dealt with in a most interesting chapter. One remark in this section is driven home to us by a letter from an officer in South Africa. Says Captain Hayes: "As a rule not one per cent. of a shipload of horses which had stood in stalls during a month's passage would have laminitis before disembarkation, but probably 50 per cent. of them would get it if they walked and trotted for ten miles immediately after landing. . . . Horses landed off a ship in which they have had no exercise for a month ought not to be obliged to walk more than half a mile to a place where they can be put up for some days."

Ignorance of this fact has supplied a costly experience to our remount officers in South Africa. Says a correspondent—"The cause of the so-called "scandal" has been wholly the treatment the remount has received in South Africa. On landing he is at once marched to the depôt at Stellenbosch, a distance of 28 miles. At this depot I saw a shipment of 400 Russian horses which had been 24 days on shipboord and marched out the day after disembarkation. One hundred suffered from laminitis. This is not an exceptional case. . . . . Officers commanding depots and the veterinary officers have protested

repeatedly against horses just arrived from the port being sent to join the columns. Their protests have been ignored and orders to forward horses have been received which they are compelled to obey."

There are dozens of other practical warnings in Captain Hayes' book of equal importance to the above. It is no use crying over spilled milk, but one cannot help a feeling of deep regret that our authorities could not and cannot even now recognise the value of expert knowledge.

From the last two chapters of this book we should like to make long quotations. The one on "Veterinary Inspection" is both interesting and instructive to professional men, as it refers to the chief injuries and diseases to be prevented and treated on board-ship. The other on "War Office and Horse Transport" is a strong indictment of the whole method of horse management at present in force. Space now prevents us making any extracts, but in a future number we hope to give a sample or two of our author's wisdom and the stupidity of the War Office. Meantime we advise our readers to buy the book and study it. If they commence it they are sure to go on, for the subject is so important and its treatment so well done that few men will put the book down till they have read it through. The publishers are Messrs. Hurst and Blackett, London: the price 3/6 net., and the type and paper such as makes reading a pleasure, even to men whose eyes are not so good as they were a decade or two ago.

CORRESPONDENCE

VETERINARY SURGEON TO THE RAMSGATE CORPORATION.

Sir,

I am glad to see that some of our members are interesting themselves in this matter. Of course most of us have had some experience of the manner and habits, "tact" of corporations and other similar bodies, and were not, therefore, much surprised at the actions of the Ramsgate Corporation. However, they seem to have had a tough fight for it, but that does not compensate Mr. Dixson nor does it show a very high degree of respect for an old and tried veterinary surgeon.

I quite understand that everybody has a right to employ who they like, and we cannot interfere, but we ought to receive proper respect and ordinary business decorum at their hands.

We have no jurisdiction over our employers, but we have—*if our Council will apply it*—over our members. I do not believe there are *many* of us who will not agree that it is *most unprofessional*—even unbusinesslike—for one veterinary surgeon to apply for a post already filled by another before the latter has resigned or received notice that his services are no longer required by his employer.

Surely this kind of thing is far worse than sending out circulars with our name, address, and the prices and uses of the various medicines we keep in stock for sale to the public?

I sincerely sympathise with Mr. Dixson, not so much on his monetary loss or his disconnections with the corporation, but on account of his position with the R.C.V.S., since this little incident places him in anything but a satisfactory position with them.

If D. informs against C. to the Registration Committee, and they decide to investigate, and find it *proven*, the Council would probably "let him off," and if the Council were pushed for a reason for their action they would say "we did not punish C. because D. brought the case *spitefully*." In other words whenever one veterinary surgeon injures another the other can never inform against him—however bad the case may be—because the Council will say it is brought *maliciously*. Such is the intelligence of our tribunal!—Yours faithfully,

GEO. A. BANHAM.

A FOOT-AND-MOUTH DISEASE OUTBREAK.

Sir,

Doubtless it will be of interest to the profession to hear a few particulars of the recent outbreak of foot-and-mouth disease.

On Thursday the 27th of March I was requested to examine a few sheep reported to be lame in one foot, the property of Mr. Stephen Swinford, of Herne. I visited Upper Grounds Farm, Chislet, distant about eight miles from Canterbury, and examined a flock of 350 ewes; some had lambs, and others expected to lamb. I found several dead lambs but no vesicles in the mouths or in the feet; there were about twenty ewes lame, some crawling on their knees to graze. I found the usual characteristic vesicles in their mouths, and between the digits, in some it was fully developed. The police were put in charge at once, and advised to close a public footpath crossing the meadows. I telegraphed from Chislet Post Office to the Board of Agriculture about 1.30 p.m. declaring an outbreak of foot-and-mouth disease.

On Friday morning Mr. McCall called on me from the Board of Agriculture, asking the nearest way to the premises, stating that my services would no longer be required. On his return he called again stating that he was of the same opinion as myself. The ewes had a short time before the outbreak been brought up from the marshes, and are distant about three or four miles from St. Nicholas where the outbreak occurred about a year back.

Now, I understand, an army of retired military officers are invading that neighbourhood with some veterinary surgeons on the staff, and the local veterinary surgeons may take a rest.

I was asked by the Local Authority to advise them as to slaughtering, which I did do in order to get rid of the severe restrictions which extend a distance of twenty-four miles in one direction. This will cause very heavy loss to the agriculturists at this period of the year. Had an inner and outer circle been declared, nothing to be moved in the former but movement be allowed by licence for short distances in the latter, the losses would have been nothing like so vexatious, and I believe it would be equally effectual in getting rid of the disease.—Faithfully yours, JAMES CROWHURST, F.R.C.V.S.

St. George's Place, Canterbury.

VIVISECTION.

Sir,

Referring to your leader under above heading in issue of 22nd instant, allow me to correct an error respecting the source of my information from which I obtained particulars of Dr. Crile's experiments upon living dogs; it was not from Dr. Bell Taylor's essay but from the brochure entitled "Scientific Research" by Mr. Stephen Smith, M.R.C.V.S., and from Dr. Crile's own work entitled "An Experimental Research into Surgical Shock." It is important that I should emphasise this fact, else the burden of responsibility will fall on the wrong shoulders.

I glean from your own pen and the long quotation from Mr. Victor Horsley's letter to *The Times* of 12th inst., that you desire to convince your readers that I have been guilty of a dishonest suppression of facts. I do not intend to retaliate in the spirit of your article or we shall find ourselves ultimately landed in a quagmire of abuse altogether unworthy of English gentlemen.

What Mr. Victor Horsley has to say upon the matter makes no difference to me, as he admits that during the last twenty years he has not seen a single experiment performed under a certificate in which an animal was conscious of pain ; if you will refer to the official Government report you will find that operations performed under these special certificates are so numerous, in proportion to the number of licensees who experimented, that you will I think wonder where Mr. Victor Horsley has been all this time not to have seen any of them, and you cannot but conclude as I do that his experience is worth very little : further Mr. Victor Horsley does not tell us that he witnessed all or even a large proportion of Dr. Crile's experiments from beginning to end, and he is therefore not in a position to state what Dr. Crile did in anæsthetising his subjects during operation. The value of the exhaustive enquiry into Dr. Crile's experiments, carried on by the Home Office, no one can estimate at its real worth better than yourself. You are I know a thorough believer in the infallibility of Governmental work, as witness your numerous articles *re* the Board of Agriculture. One department is just as reliable as another, and I leave you to determine as to the real value of the enquiry which Mr. Victor Horsley seems to think must of necessity be conclusive. Now I am coming to the kernel of the whole matter, namely, what Dr. Crile has to say about himself ; that beats all that Mr. Victor Horsley, Mr. Stephen Paget, or even you have to say about it. I find from his work that he performed sixteen experiments upon living dogs at University College, London, between April 25th and May 23rd, 1895, under the head of protocols he gives particulars in full detail of each experiment, describing the nature and character of the shocks, with the results affecting blood pressure and respirations, and notwithstanding that he knew perfectly well that he was licensed to operate so that "the animal must during the whole of the experiment be under the influence of some anæsthetic of sufficient power to prevent the animal feeling pain," no reference to the administration of an anæsthetic of any sort whatever is made in experiments 1, 2, 3, 4, 10, 11, 12, 13, 14 and 15. In experiment 5 the animal is stated to have been under *incomplete* anæsthesia while undergoing crushing of the foot, and this was subsequent to some preliminary dissection, and it is worthy of special note that the autopsy was not made until the day after this experiment ; the impression which any unbiassed mind would form after reading the whole of the protocol is that the animal was left to linger and die after the day's work of experimentation. Query, had Dr. Crile a certificate marked "B" to warrant such a procedure ?

Protocol 6 refers in an off hand sort of style to ether after a preliminary attempt at removal of stellate ganglion, and finishes up as follows, "Autopsy was made while the heart was still beating slow and full." Of course it may be claimed the dog was under full anæsthesia, but after previous experiment one is justified in entertaining doubts.

Protocols 7 and 8 were both performed under ether, though in these, as in all the others, where anæsthetics are mentioned, the reference is given in such a light and airy way, and no assurance is afforded that in any of the experiments the requirements of the Act were met, namely that the anæsthetic was of sufficient power to prevent the animal feeling pain.

Protocol 9 gives details of crushing the testicle and the results : also three subsequent experiments upon this organ, followed by crushing the paw ; it then states "These operations were attended by considerable hæmorrhage ; at the same time the animal required ether." It oes without saying that this speaks for itself. Protocols 11 and 12 make no reference to anæsthesia but they wind up by stating that the dog was allowed to bleed to death by cutting the femoral artery. Protocol 16 after stating that resection of stellates was made it was found "at one time the anæsthesia was overlooked." This animal underwent hip joint amputation, cutting sciatic nerve, sawing the femur, boiling water poured on intestines. It is worthy of special note that in no instance does it appear that chloroform was resorted to, and what is the reason of this ? Presumably Dr. Crile discovered that dogs do not bear the administration of chloroform ; indeed he himself states on page 137 of this work, "Chloroform required much greater care than ether—chloroform proved to be more toxic than ether" ; and on page 146, "Over anæsthesia rendered the animals subject to early collapse and decidedly less capable of enduring a protracted experiment" : and a little further on the same page, "considerable care was necessary to prevent excessive inhalation of the anæsthetic by the animal. What do the quotations point to, but that Dr. Crile recognised and was obliged to acknowledge, what any veterinary surgeon who has had canine practice knows, that dogs taken as a class do not stand the administration of an anæsthetic of sufficient power to prevent the animal feeling pain ; he was, however, obliged to make some sort of an apology to his English readers and this is how he has done it. You are doubtless aware that the journal known as *The Hospital* is essentially in sympathy with vivisection work ; turn to the issue of April 29th, 1899, and see what is stated therein in a criticism of Dr. Crile's treatise and work, the following appeared "Since then as Dr. Crile's energies were practically restricted to the observation of the variations in blood pressure and respiration produced in dogs—as he assures us, all anæsthetised—by various mutilations, we are greatly surprised that in the notes practically no information is afforded us of the anæsthetic employed in each case, of the quantity used, or of the duration of its employment. And again, we are totally unable to conceive what bearing on traumatic shock, as we know it clinically, how the results of pouring boiling water into dog's abdominal cavities or even the forcible dilatation of the vaginas of bitches."

Taking everything into consideration I feel that I was perfectly justified in referring to Dr. Crile's experiments in the manner that I did. I am very glad that you have drawn attention to the importance of a full anasthesia in all physiological experiments being brought about, but let it be distinctly understood without any bye-play or pretence, that the anæsthesia must be carried to the extent of preventing the animal feeling pain. If you have not read the Croonian lecture on the Mammalian Nervous System by Mr. Francis Gotch and Mr. Victor Horsley, I commend it to your notice, especially the clause on Anæsthesia, page 371, and the two middle paragraphs on page 408, and then tell me whether you think the experiments referred to were carried out strictly in the terms of the Act, as regards the feeling of pain. Of course none of them could have been conducted under certificates A or B because Mr. Victor Horsley never saw such during 20 years !—Yours truly,

J. Sutcliffe Hurndall, M.R.C.V.S.

Sussex Villas, Kensington.
March 31st.

[One sentence in this letter is worth attention. It is "What Mr. Victor Horsley has to say on the matter makes no difference to me." The knowledge of the subject possessed by Mr. Horsley and Mr. Hurndall is as different as between an earthquake and a threepenny-bit, and knowledge ought to have some weight.—Ed].

Communications, Books, and Papers received.—Capt. C. B. M. Harris, Col. J. A. Nunn, Messrs. E. White Wallis, D. Hutcheon. J. J. Gorman, J. Sutcliffe Hurndall, James Crowhurst, T. Parker, M. Graham. E. S. B.

"*Structure of the Horse's Foot, and Principles of Shoeing.*" "*Dentition in Animals of the Farm.*" *St. James's Gazette, The Bulwayo Chronicle.*